NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

Upland Wildlife Habitat Management

(Acre)

Code 645

DEFINITION

Creating, restoring, maintaining or enhancing areas for food, cover, and water for upland wildlife and species which use upland habitat for a portion of their life cycle.

PURPOSES

This conservation practice may be applied as part of a system to accomplish one or more of the following resource management objectives.

- Provide food for the desired wildlife species.
- Provide a variety of cover types for the desired wildlife species.

CONDITIONS WHERE PRACTICE APPLIES

On all landscapes that are suitable for the types of wildlife habitat that are needed within the range of the desired species or the natural community under consideration.

CRITERIA

General criteria applicable to all purposes

Habitat development and management shall achieve sustainable populations for specifically identified species and to meet the objectives of the land user.

The amounts and types of habitat elements planned, location, and management shall be identified in a management plan.

Habitat shall be managed so that soil loss does not exceed tolerable limits.

Harvesting or grazing by domestic livestock shall not be permitted, unless specified in an approved grazing plan.

Species planted shall be suitable for the planned purpose, soils, climate and site conditions. Native plant species shall be used whenever possible. Use of known invasive species shall be avoided.

When water is a limiting factor for the target species, an adequate water supply shall be provided. The water supply shall come from either existing water sources or be developed using appropriate NRCS standards.

When managing for early successional species such as Bob White Quail, Pheasant, Eastern Cottontail Rabbit, and grassland songbirds, regular, periodic disturbance of the habitat, as detailed in FOTG (647) *Early Successional Habitat Development and Management,* shall be followed.

When a management plan includes the use of Prescribed Burning, the plan shall include a firebreak following the FOTG (394) *Firebreak* Standard.

Tree and/or shrub plantings shall follow site preparation, planting dates, planting and storage guidelines as detailed in FOTG (612) *Tree/Shrub Establishment*.

This practice shall comply with all federal, state, and local laws.

Additional criteria to provide food for the desired wildlife.

Food Plots shall be left standing throughout the winter and spring until replanted.

Planting shall occur early enough to allow species maturity before frost.

Seeding mixtures for food plots shall be chosen from Tables 1a and 1b.

Annual food plots shall be rotated each year. Plant only 1/3 of the food plot each year. Allow the natural succession of forbs to occur on the remaining 2/3 of the food plot.

If food plots are relocated or discontinued, the site shall be re-seeded to surrounding cover, based on this standard.

FOOD PLOTS

Table 1a. *Annual* food plot planting rates.

Species	Single Species Rate (lbs./ac)	Multiple Species[1] Rate (lbs./ac)	Species Benefited
Buckwheat *Eriogonum Michx.*	20	8	Deer, quail, turkey, pheasant, songbirds
Corn *Zea mays*	15	4	Deer, quail, turkey, pheasant, squirrels
Cowpeas *Vigna unguiculata*	20	5	Deer, quail, turkey, pheasant, dove
German/Pearl Millet *Pennisetum glaucum*	8	2	Deer, quail, turkey, pheasant, dove, songbirds
Grain Sorghum/Milo *Sorghum bicolor*	12	4	Deer, quail, turkey, pheasant, dove, songbirds
Oats *Avena spp.*	40	10	Deer, quail, turkey, pheasant, songbirds
Partridge pea Cassia fasciculata	10	2	Quail, turkey, pheasant
Soybeans *Glycine max*	45	8	Deer, quail, turkey, pheasant
Sunflowers *Helianthus spp.*	12	2	Deer, quail, turkey, pheasant, dove, songbirds
Wheat *Triticum spp.*	25	10	Deer, quail, turkey, pheasant, dove, songbirds
White Proso Millet *Panicum miliaceum*	12	4	Quail, turkey, pheasant, dove, songbirds

[1] Total mix not to exceed 20 lbs./ac

Table 1b. *Perennial* food plot planting rates.

Species	Single Species Rate (lbs./ac)	Species Benefited
Alfalfa (*Medicago sativa*)	6	Deer, quail, turkey, pheasant, rabbit, songbirds
Alsike clover (*Trifoliium hybridum*)	2	Deer, quail, turkey, pheasant, rabbit, songbirds
Ladino clover (*Trifolium repens*)	1	Deer, quail, turkey, pheasant, rabbit, songbirds
Red clover (*Trifolium pratense*)	5	Deer, quail, turkey, pheasant, rabbit, songbirds
Common, Kobe, or Marion Lespedeza[1]	5	Deer, quail, turkey, pheasant, rabbit, songbirds

[1] Annuals that will maintain themselves by re-seeding for several years. Best suited for sites **south** of Interstate 70.

Additional criteria to provide a variety of cover types for the desired wildlife species.
Shrub species used to provide cover for the desired wildlife species shall be selected from Table 2.

Shrubs shall be planted in blocks, clumps or strips with spacing designed to meet the habitat requirements of the desired wildlife species. Clumps and strips shall have an irregular shape. Strips shall be planted based upon field configuration and wildlife habitat needs.

Tree species used to provide cover for the desired wildlife species shall be selected from Tables 3a, 3b, 3c and 3d.

Trees shall be planted in blocks, clumps or strips with spacing designed to meet the habitat requirements of the desired wildlife species.

Warm Season Grass, Legume and Forb species used to provide cover for the desired wildlife species shall be selected from Table 4.

Cool Season Grass, Legume and Forb species used to provide cover for the desired wildlife species shall be selected from Table 5.

Wildlife corridors shall include at least three rows of shrubs (see Table 2), one row of a soft mast tree species (see Table 3c), and one row of a hard mast tree species (see Table 3d). Mast is the fruit or nuts produced by certain tree species.

Tree and shrub plantings designed for wildlife corridors shall be based on wildlife species requirements. Corridors shall be a minimum width of 50 feet.

If needed, containerized (potted) stock shall be planted at a rate of 40 stems per acre**.** Clump planting of trees shall be considered when potted stock is likely to fail over large portions of a site due to flooding and wetness. Clumps will be placed on the highest elevations available on wet sites. The maximum number of trees to plant in a clump shall be 80 trees per acre. The clump size shall be between ¼ acre and 1 acre unless site conditions suggest otherwise.

The following key for Soil Drainage Class Suitability applies to the tables listed below.
ED = Excessively Drained
WD = Well Drained
MWD = Moderately Well Drained
SPD = Somewhat Poorly Drained
PD = Poorly Drained
VPD = Very Poorly Drained

Table 2. Shrub List.

Common Name *Scientific Name*	Soil Drainage Class Suitability	Ave. Mature Height (ft.)	Wildlife Information	General Comments
American Plum *Prunus americana*	MWD – ED	30	Fruit eaten by songbirds. Recommended for quail and turkey.	Reddish drupe.
Arrowwood *Vibrunum dentatum*	MWD - WD	9	Fruit eaten by songbirds.	Drupe ¼" long, bluish-black.
Ash, Prickly *Xanthoxylum americanum*	SPD – WD	9		A thicket forming shrub with prickly leafstalks. Fruits are a small reddish-brown pod.
Bayberry, Northern *Myrica pensylvanica*	MWD - ED	2 - 8	Fruit and seeds eaten by songbirds. Low, brushy stature provides concealment for ground-dwelling wildlife.	Small, grayish-silver berries attached to main stems of plant. Male and female plants needed to produce berries. Not native to Indiana.
Blackhaw *Viburnum prunifolium*	MWD - WD	20	Fruit eaten by songbirds, quail, fox and turkey.	Drupe ½ " long.
Bladdernut *Staphylea trifolia*	SPD – WD	10		3 lobed balloon like capsule.
Chokecherry *Prunus virginiana*	SPD – WD	18	Fruit eaten by songbirds.	Fruit 1/3" long, dark-purple.
Chokeberry, Black *Aronia melanocarpa*	SPD – WD	10	Fruit eaten by songbirds. Recommended for turkey.	Fruit 1/3" long, dark-purple.
Coralberry *Symphoricarpos orbiculatus*	MWD - WD	5	Fruit eaten by songbirds, quail, and ruffed grouse.	Fruits coral to purple.
Crabapple, Flowering *Malus spp.*	SPD - WD	8 - 20	Fruits eaten by birds, deer and small mammals.	Many varieties: growth form, flowers, fruit, color and size vary.
Devils Walking Stick *Aralia spinosa*	SPD - MWD	20	Fruit eaten by birds.	Showy white flowers, black drupe.
Dogwood, Alternate Leaf *Cornus alternifolia*	SPD – WD	18	Fruit eaten by birds. Twigs browsed by deer and rabbits.	Blue-black fruit with red stems. Leaves not opposite.
Dogwood, Flowering *Cornus florida*	MWD - WD	30	Recommended for quail and turkey.	Showy flowers, glossy red drupe.
Dogwood, Gray *Cornus racemosa*	SPD – WD	8	Fruit eaten by pheasant turkey and grouse.	Red pedicles in winter, white drupe.
Dogwood, Red Osier *Cornus stolonifera*	VPD – WD	10	Fruit eaten by songbirds, grouse, quail and turkey. Twigs browsed by deer and rabbits.	Reddish stem, white drupe, good winter color.
Dogwood, Rough Leaved *Cornus drummondii*	PD – WD	18	Fruit eaten by songbirds, grouse, quail, turkey and pheasant. Twigs browsed by rabbits and deer.	White drupes.
Dogwood, Silky *Cornus amomum*	VPD – WD	10	Sometimes browsed by rabbits and deer.	Bluish fruit, likes moist soils and partial shade.
Eastern Wahoo *Euonymus atropurpureus*	SPD – WD	12	Fruit eaten by birds.	4 lobed red capsule, sometimes winged stem.

Table 2. Shrub List (continued).

Elderberry *Sambucus canadensis*	VPD – WD	9	Fruit eaten by many birds including pheasant and dove. Recommended for quail and turkey.	Purple-black drupe used for jams, jellies, pies, and wine.
Hazel Alder *Alnus serrulata*	VPD – WD	18	Deer browse on the twigs.	Prefers wet to moist soils. Long lenticles on the stem.
Hazelnut *Corylus americana*	MWD - WD	15	Small nut eaten by squirrel, deer, jays, grouse, and pheasant. Recommended for quail and turkey.	Often forms large colonies.
Highbush Cranberry *Viburnum trilobum*	VPD – WD	9	Fruit eaten by grouse, pheasant and songbirds. Recommended for turkey.	Tart red fruits. Showy.
Indigobush *Amorpha fruticosa*	VPD – WD	6		Small pods, flowers purplish spikes.
Leadplant *Amorpha canescens*	WD – ED	3		Small erect prairie shrub with purple flowers.
Nannyberry *Viburnum lentago*	SPD – WD	18	Fruit eaten by songbirds. Recommended for turkey.	Blue-black fruits similar to raisins.
New Jersey Tea *Ceanothus americanus*	WD - ED	3	Quail and wild turkey eat the three-celled capsule.	Prairie plant with white flower in dense heads.
Ninebark *Physocarpus opulifolius*	VPD – WD	10	Fruit are small dry bladders. Recommended for turkey.	White to pinkish flowers.
Pawpaw *Asimina triloba*	SPD – WD	20	Fruit eaten by opossum, squirrels, raccoon, & fox.	Large leaves, likes deep moist soils.
Prairie Crab *Malus ioensis*	PD – WD	30	Fruit eaten by opossum, squirrel, raccoon and fox. Recommended for turkey.	Small fruit, showy flowers.
Redbud *Cercis canadensis*	MWD – WD	30	Seeds eaten by a few songbirds.	A legume, 2-3" pod, reddish-purple flowers, heart shaped leaves.
Shrubby St. Johnswort *Hypericum prolificum*	SPD – WD	6		Bright yellow flowers, 3-valved capsule.
Spicebush *Lindera benzoin*	VPD – WD	9	Twigs and fruit eaten by songbirds, grouse, rabbit, opossum, quail and deer. Recommended for turkey.	Small red drupe.
Spirea *Spiraea alba* *Spirea tomentosa*	VPD – WD	4	Buds eaten by ruffed grouse. Twigs browsed by deer and rabbits.	Pink flowers. Also called Meadowsweet or Hardack.
Sumac, Shining *Rhus copallina*	MWD – ED	8	Fruit eaten by songbirds, quail, dove, pheasant. Recommended for turkey.	Reddish fruit. Tolerates dry, infertile soils.
Sumac, Smooth *Rhus glabra*	MWD – ED	12	Twigs and fruit eaten by songbirds, pheasant, and dove. Recommended for quail and turkey.	Often forms large colonies. Reddish fruit.

Table 2. Shrub List (continued).				
Sumac, Staghorn *Rhus typhina*	MWD – ED	15	Fruit eaten by songbirds, quail, dove, pheasant. Twigs browsed by rabbits and deer. Recommended for turkey.	Tolerates dry, infertile soils. Reddish fruit.
Wild Blackberry *Rubus allegheniensis*	MWD – ED	5	Provides cover and food for birds and mammals. Recommended for quail and turkey.	Upright arching shrub with stout prickles.
Wild Raspberry *Rubus occidentalis*	MWD – WD	5		Arching shrub with strong hooked prickles.
Wild Sweet Crabapple *Malus coronaria*	SPD – ED	30	Recommended for quail and turkey.	Yellow-green edible fruit with highly fragrant flowers.
Willow, Prairie *Salix humilis*	PD - SPD	13	Use where prairie requires woody vegetation for the targeted species, such as perches for Dickcissels.	Recommended for prairie restorations. Flowers from late April through mid May.
Winterberry *Ilex verticillata*	VPD - WD	15	Buds and twigs browsed by deer and rabbits.	Provides a bright red ¼" fruit in fall that persists after leaf drop. Prefers moist acid soil conditions. Male and female plants are needed for fruit production.
Witch-hazel *Hamamelis virginiana*	SPD – WD	18	Seeds, buds and twigs eaten by deer, rabbit, quail and pheasant.	Pale yellow flowers that produce seedpods.

Table 3a - Pine/Softwood Species

Common Name *Scientific Name*	Soil Drainage Class Suitability	Ave. Mature Height (ft.)	Wildlife Information	General Comments
Baldcypress *Taxodium distichum*	VPD – WD	80	Waterfowl occasionally consume seeds. Trees also serve as perching areas for song and wading birds.	The baldcypress is 1 of 2 deciduous conifer trees native to Indiana. Very flood tolerant.
Cedar, Eastern Red *Juniperus virginiana*	SPD - ED	45	Berries consumed by songbirds. Recommended for turkey.	Small coniferous tree tolerant of dry, sterile soils.
Cedar, Northern White *Thuja occidentalis*	PD – WD	40	Foliage often browsed by deer in late winter as an emergency food source. Recommended for turkey.	A medium sized evergreen once common in northern Indiana bogs. Attains best form on calcareous soils. Common ornamental.
Hemlock, Eastern *Tsuga canadensis*	SPD - WD	70	The dense low foliage of young plants makes good winter cover for grouse, turkey, deer, and other wildlife. Excellent nesting habitat. Small winged seeds fed on by chickadees, pine siskins, crossbills, and red squirrels; twigs browsed by deer, and rabbits.	Hemlocks prefer a moist, well-drained, slightly acid soil with protection from heat, drought and wind.
Pine, Eastern White *Pinus strobus*	MWD – WD	90	Pines make excellent roosting trees for many species of birds. Seeds are eaten by a wide variety of birds, squirrels and mice. Recommended for turkey.	Large tree capable of attaining heights over 200 feet under ideal conditions. Bluish-green needles grow in groups of 5. Native only in a few spots in the west-central portion of the state.

Table 3a - Pine/Softwood Species (continued)

Pine, Jack *Pinus banksiana*	WD - ED	40	Pines make excellent roosting trees for many species of birds. Seeds are eaten by a wide variety of birds, squirrels and mice. Recommended for turkey.	Plant in northern Indiana only. Has serotinous cones that open to release seeds from forest fires. Tolerates dry acid soil conditions.
Pine, Virginia *Pinus virginiana*	MWD – ED	40		Small sized tree with needle in-groups of two. Cones bear sharp prickles.

Table 3b. Non-mast Producing Species

Common Name *Scientific Name*	Soil Drainage Class Suitability	Average Mature Height (ft.)	Wildlife Information	General Comments
Aspen, Bigtooth *Populus grandidentata*	MWD - WD	70	Twigs and bark consumed by deer and beavers. Buds and catkins eaten by ruffed grouse. Recommended for turkey.	Medium sized tree with olive-gray bark which becomes furrowed on older trees.
Cottonwood, Eastern *Populus deltoides*	PD – ED	90		Large tree typical of riverbanks. The triangle shaped (deltoid) leaves give this tree its specific name.
Sycamore, American *Platanus occidentalis*	PD – WD	90	Sycamore has low food value to wildlife, however, this species forms an important structural component of bottomlands and floodplains.	The sycamore has multicolored bark and is one of our largest trees. It is capable of attaining heights of over 100 feet.

Table 3c. Soft Mast Producing Trees

Common Name *Scientific Name*	Soil Drainage Class Suitability	Average Mature Height (ft.)	Wildlife Information	General Comments
Ash, Green *Fraxinus pennsylvanica*	VPD – WD	60	Seeds eaten by squirrels, quail and songbirds.	Medium sized tree, common component of swamps and floodplains.
Ash, White *Fraxinus americana*	MWD – WD	70	Seeds eaten by squirrels, quail and songbirds. Recommended for turkey.	Common tree of upland forests. Forms a large straight bole with interlacing bark with age.
Birch, River *Betula nigra*	VPD - WD	50	Stands of birch serve as important cover for riparian dwelling animals.	Small to medium sized tree of floodplains. Has Cinnamon colored, exfoliating bark.
Cherry, Black *Prunus serotina*	MWD – WD	70	Familiar fruits eaten by many species of songbirds, ruffed grouse and pheasant. Recommended for turkey.	Tall tree of well drained soils. Valuable timber species that produces white blossoms and edible fruits.
Gum, Black *Nyssa sylvatica*	PD – WD	60	Fruits consumed by songbirds, and Pileated woodpeckers. Recommended for turkey.	Medium sized tree, which thrives in both upland and wetland conditions. Foliage turns a red color in fall.
Hackberry *Celtis occidentalis*	SPD – WD	50	Fruits sparingly eaten by songbirds, including cedar waxwings, and robins during winter. Recommended for turkey.	Small to medium sized tree of calcareous soils and floodplains. Taste of the fruits similar to dates, but contain a large seed.

Table 3c. Soft Mast Producing Trees

Hawthorn, Cockspur *Crataegus crus-galli*	ED - SPD	30	Fruits are important winter food source for many songbirds including ruffed grouse. Fruit eaten by deer, fox, rabbit, pheasant and turkey. Excellent nesting habitat for songbirds.	Large shrubs or small trees that usually bear stout spines. White flowers yield small, apple like fruits. Common in disturbed woodlands that had previously been pasture.
Hawthorn, Green *Crataegus viridis*	ED - SPD	30		
Hawthorn, Washington *Crataegus phaenopyrum*	ED – SPD	30		
Kentucky Coffeetree *Gymnocladus dioicus*	SPD – WD	50	Fruits relished by squirrels, opossum, raccoon and songbirds.	Uncommon, medium sized tree with gray, scaly bark. Fruit a thick, brown pod.
Maple, Black *Acer nigrum*	MWD – WD	70	Samaras are widely consumed by birds and squirrels. Browsed by deer. Recommended for turkey.	Similar to sugar maple, but with leaves 3-lobed and darker green on top.
Maple, Red *Acer rubrum*	VPD – WD	70		Medium sized tree of swampy areas, but also found in upland conditions. Leaves scarlet red in fall.
Maple, Silver *Acer saccharinum*	VPD – WD	80		Very fast growing medium sized tree of floodplains and poorly drained soils. Small yellow (female) and reddish (male) flowers appear very early in the spring.
Maple, Sugar *Acer saccharum*	MWD – WD	70		One of the most common medium sized trees of well-drained woodlands. Five-lobed leaves turn a brilliant yellow-orange in fall.
Persimmon *Diospyros virginiana*	MWD – WD	50	Raccoons as well as some songbirds readily consume large berries.	Small tree found in bottomlands and old fields. Fruit, a large berry, is edible when ripe.
Sassafras *Sassafras albidum*	ED – SPD	40	Browsed by deer, rabbits, beaver, fox squirrel and woodchuck. Fruit eaten by raccoons, squirrels, woodchucks and many songbirds. Recommended for quail.	Fruit an oblong, bluish black drupe about 1/4" long. Good fence row cover. Re-sprouts if cut. Roots can be brewed to make tea.
Serviceberry *Amelanchier arborea*	MWD – WD	30	Purplish fruits rapidly consumed by birds. Recommended for turkey.	Small, uncommon tree of well drained woodlands. Flowers are white and appear in April. This tree is also known as Juneberry because the fruit usually ripens in early summer.
Sweetgum *Liquidambar styraciflua*	PD – WD	85	Seeds consumed by finches in winter.	Large tree common in bottomlands of southern Indiana. Fruit is a prickly ball with multiple capsules.
Tuliptree *Liriodendron tulipifera*	MWD – WD	90	Seeds eaten by songbirds, squirrels, quail and turkey.	Common, large sized tree is a member of the magnolia family. Fruits are upright, which remain on the twigs through winter.

Table 3d. Hard Mast Producing Trees

Common Name *Scientific Name*	Soil Drainage Class Suitability	Average Mature Height (ft.)	Wildlife Information	General Comments
Beech, American *Fagus grandifolia*	MWD – WD	75	Nuts consumed by deer, and squirrels. Recommended for turkey.	Extremely shade tolerant species with decorative smooth gray bark.
Buckeye, Ohio *Aesculus glabra*	SPD – WD	60	Nuts sparingly consumed by eastern fox squirrels.	Fast growing species. Twigs poisonous to livestock.
Butternut *Juglans cinerea*	MWD – WD	50	Elliptical nuts consumed by squirrels.	Small to medium sized tree with gray furrowed bark. Uncommon.
Hickory, Bitternut *Carya cordiformis*	SPD – WD	50	The nuts of these species constitute an important food source for squirrels and Wood ducks. Recommended for turkey.	Medium sized tree of moist woodlands. Winter buds are sulfur-yellow. The common name is derived from the bitter taste of the nut.
Hickory, Mockernut *Carya glabra*	ED – MWD	50	The nuts of these species constitute an important food source for squirrels and Wood ducks Recommended for turkey.	Small to medium sized hickory whose name is derived from the small size of the sweet kernel, relative to the overall size of the nut.
Hickory, Pignut *Carya glabra*	WD – ED	50		Medium sized tree.
Hickory, Shagbark *Carya ovata*	MWD – WD	70	The loose shaggy bark makes excellent bat roosting sites. Recommended for turkey.	Medium sized tree typical of well-drained soils throughout Indiana.
Oak, Black *Quercus velutina*	MWD – ED	60	Acorns from oaks are perhaps the most important food source for a variety of wildlife including woodpeckers, squirrels, and deer. Recommended for turkey.	Medium sized tree of well drained to dry soils. Bark is black and blocky.
Oak, Bur *Quercus macrocarpa*	PD – ED	80		Medium to large sized tree. Grows most typically in mesic woodlands and along floodplains, but is also very drought and fire tolerant. Large acorns with fringed caps.
Oak, Cherrybark *Quercus pagoda*	SPD – WD	75		Large tree of bottomlands and well-drained soils. Found only in the extreme southwestern part of Indiana.
Oak, Chinquapin *Quercus muhlenbergii*	MWD – ED	60		Small to medium sized tree of calcareous soils and well-drained bottomlands. Bark is scaly with a yellowish cast.
Oak, Pin *Quercus palustris*	VPD – WD	75	The smaller pin oak acorns are particularly favored by wood ducks.	Common medium sized oak of poorly drained soils and floodplains. Dead branches are seldom shed from the trunk of this species giving it a characteristic appearance.
Oak, Red *Quercus rubra*	MWD – WD	80		Common medium to large sized tree of mesic woodlands. Bark is blocky at the base of old trees while the upper portion of the trunk resembles “ski tracks”.

Table 3d. Hard Mast Producing Trees (continued)

Oak, Scarlet *Quercus coccinea*	MWD – ED	70	Acorns from oaks are perhaps the most important food source for a variety of wildlife including woodpeckers, squirrels, and deer. Recommended for turkey.	Medium sized tree of dry ridges. Leaves turn a brilliant scarlet in autumn.
Oak, Shingle *Quercus imbricaria*	SPD – WD	50		Small to medium sized tree of mesic woodlands. Leaves remain through winter. Uncharacteristically, leaves of this species are unlobed.
Oak, Shumard *Quercus shumardii*	SPD – WD	75		Large tree of well-drained soils and bottomlands. Closely resembles red oak, but usually occurs lower on the landscape.
Oak, Swamp Chestnut *Quercus michauxii*	SPD – WD	70		Medium to large tree of poorly drained soils. Bark may be confused with that of white oak, but has coarsely serrate margined leaves.
Oak, Swamp White *Quercus bicolor*	VPD – WD	70		Medium sized tree of poorly drained soils. The specific name, bicolor, refers to the two toned leaves which are dark and shiny above, and dull and white below.
Oak, White *Quercus alba*	MWD - WD	90		Tree with scaly, silvery bark.
Pecan *Carya illinoensis*	SPD - WD	120	Ellipsoid nuts readily consumed by a variety of wildlife.	Large tree with sweet edible nuts.
Walnut, Black *Juglans nigra*	MWD – WD	80	Nuts consumed by squirrels.	Medium sized tree typical of central hardwood forests. Valuable timber species. Bark chocolate colored and blocky with age.

Table 4. Seeding Mixtures for Warm Season Grasses.[1]

Seeding Mixtures	Application Rate (lbs./ac of PLS[2])		Soil Drainage Class Suitability
	Wildlife	Erosive Areas	
Big Bluestem *(Andropogon gerardii)*	0.75	1	PD - ED
Indiangrass *(Sorghastrum nutans)*	0.75	1	SPD - ED
Little Bluestem *(Schizachyrium scoparium)*	1.75	2.5	MWD - ED
Sideoats Grama *(Bouteloua curtipendula)*	1	1.5	MWD - ED
or Canada wildrye *(Elymus canadensis)*	1	2	MWD - ED
Common, Kobe, or Marion Lespedeza[3] *(Kummerowia striata)* **or** a forb mix[5]	2	2	MWD - ED
Little Bluestem *(Schizachyrium scoparium)*	2.5	4	MWD - ED
Indiangrass *(Sorghastrum nutans)*	0.75	1	SPD - ED
Sideoats Grama *(Bouteloua curtipendula)*	0.75	1	MWD - ED
or Canada wildrye *(Elymus canadensis)*	1	2	MWD - ED
Common, Kobe, or Marion Lespedeza[3] *(Kummerowia striata)* **or** a forb mix[5]	2	2	MWD - ED
[4]Switchgrass *(Panicum virgatum)*	1.75	2	PD - ED
or Switchgrass *(Panicum virgatum)* **and**	0.5	1	PD - ED
Virginia wildrye *(Elymus virginicus)*	1	2	PD - WD
Big Bluestem (*Andropogon gerardii)*	1	2	PD - ED
Indiangrass *(Sorghastrum nutans)*	0.5	1	SPD - ED
Common, Kobe, or Marion Lespedeza[3] *(Kummerowia striata)* **or** a forb mix[5]	2	2	MWD - ED
Big Bluestem *(Andropogon gerardii)*	1	1.5	PD - ED
Indiangrass *(Sorghastrum nutans)*	1.5	2	SPD - ED
Little Bluestem *(Schizachyrium scoparium)*	1	1.0	MWD - ED
Sideoats Grama *(Bouteloua curtipendula)*	0.5	1.0	MWD - ED
or Canada wildrye *(Elymus canadensis)*	1	1	MWD - ED
Common, Kobe, or Marion Lespedeza[3] *(Kummerowia striata)* **or** a forb mix[5]	2	2	MWD - ED

[1] If using prepackaged mixes, application rates shall be equal to those listed in Table 4 for designated uses.

[2] Pure Live Seed. To calculate percent PLS rates, multiply the percent purity by the percent germination. Divide the seeding rate by the %PLS to find the bulk seed needed per acre. Example: 98% Purity X 60% Germination = .588 PLS, 10 pounds seed per acre/.588 PLS = 17 pounds of bulk seed per acre.

[3] Substitutes for *Lespedezas* must be used on sites north of Interstate 70.

[4] This seeding mixture can be used on wet sites.

[5] Use ½ to 1 lb. of a perennial forb mix, with a minimum of 5 species (see Forb List below) in approximately equal proportions.

Table 5. Seeding Mixtures for Cool Season Grasses.

Seeding Mixtures	Application Rate (lbs./ac of PLS)		Soil Drainage Class Suitability
	Wildlife	Erosive Areas	
[1,2] Orchardgrass *(Dactylis glomerata)*	2	6	MWD - ED
Timothy *(Phleum pratense)*	1	2	PD - WD
Common, Kobe, or Marion Lespedeza *(Kummerowia striata)*[5], **or** a forb mix[6]	2	4	MWD - ED
Ladino Clover *(Trifolium repens)*	¼	¼	PD - WD
[1] Redtop *(Agrostis gigantea)*	1	2	PD - WD
Orchardgrass *(Dactylis glomerata)*	2	6	MWD - ED
Common, Kobe, or Marion Lespedeza *(Kummerowia striata)*[5], **or** a forb mix[6]	2	4	MWD - ED
Ladino Clover *(Trifolium repens)*	¼	¼	PD - WD
[1] Redtop *(Agrostis gigantea)*	1	2	PD - WD
Timothy *(Phleum pratense)*	1	2	PD - WD
Red Clover *(Trifolium pratense)*	1	2	MWD - ED
Common, Kobe, or Marion Lespedeza *(Kummerowia striata)*[5], **or** a forb mix[6]	2	4	MWD - ED
Orchardgrass *(Dactylis glomerata)*	2	6	MWD - ED
Timothy *(Phleum pratense)*	1	2	PD - WD
Alfalfa *(Medicago sativa)*	3	6	MWD - ED
Ladino Clover *(Trifolium repens)*	¼	¼	PD - WD
[3] Smooth Bromegrass *(Bromus inermis)*	5	10	MWD - ED
Alfalfa *(Medicago sativa)*	3	6	MWD - ED
Ladino Clover *(Trifolium repens)*	¼	¼	PD - WD
Birdsfoot Trefoil *(Lotus corniculatus)*	2	4	PD - WD
[4] Timothy *(Phleum pratense)*	1	2	PD - WD
Smooth Bromegrass *(Bromus inermis)*	5	10	MWD - ED
Alsike Clover *(Trifoliium hybridum)*	½	1	PD - WD
Birdsfoot Trefoil *(Lotus corniculatus)*	2	4	PD - WD
[1] Timothy *(Phleum pratense)*	1	2	PD - WD
Kentucky Bluegrass *(Poa pratensis)*	1	3	PD - WD
Common, Kobe, or Marion Lespedeza *(Kummerowia striata)*[5], **or** a forb mix[6]	2	4	MWD - ED
Birdsfoot Trefoil *(Lotus corniculatus)*	2	4	PD - WD
[4] Redtop *(Agrostis gigantea)*	1	2	PD - WD
Timothy *(Phleum pratense)*	1	2	PD - WD
Alsike Clover *(Trifolium hybridum)*	1	2	PD - WD
Birdsfoot Trefoil *(Lotus corniculatus)*	2	4	PD - WD
[1] Redtop *(Agrostis gigantea)*	1	2	PD - WD
Kentucky Bluegrass *(Poa pratensis)*	1	3	PD - WD
Common, Kobe, or Marion Lespedeza *(Kummerowia striata)*[5], **or** a forb mix[6]	2	4	MWD - ED
Ladino Clover *(Trifolium repens)*	¼	¼	PD - WD

Table 5. Seeding Mixtures for Cool Season Grasses (continued)

Seeding Mixtures	Application Rate (lbs./ac of PLS)		Soil Drainage Class Suitability
	Wildlife	Erosive Areas	
[3] Smooth Bromegrass *(Bromus inermis)*	5	10	MWD - ED
Timothy *(Phleum pratense)*	1	2	PD - WD
Ladino Clover *(Trifolium repens)*	¼	¼	PD - WD
Birdsfoot Trefoil *(Lotus corniculatus)*	2	4	PD - WD
[1] Orchardgrass *(Dactylis glomerata)*	1	6	MWD - ED
Timothy *(Phleum pratense)*	1	2	PD - WD
Red Clover *(Trifolium pratense)*	1	2	MWD - ED
Ladino Clover *(Trifolium repens)*	¼	¼	PD - WD
Common, Kobe, or Marion Lespedeza *(Kummerowia striata)*[5], **or** a Forb mix[6]	2	4	MWD - ED
[1] Orchardgrass *(Dactylis glomerata)*	2	6	MWD - ED
Timothy *(Phleum pratense)*	1	2	PD - WD
Red Clover *(Trifolium pratense)*	1	2	MWD - ED
Sweet Clover *(Melilotus P. Mill)*	1 ½	3	MWD - ED
[1] Timothy *(Phleum pratense)*	1	2	PD - WD
Kentucky Bluegrass *(Poa pratensis)*	1	3	PD - WD
Common, Kobe, or Marion Lespedeza *(Kummerowia striata)* [5], **or** a Forb mix[6]	2	4	MWD - ED
Red Clover *(Trifolium pratense)*	1	2	MWD - ED
Orchardgrass *(Dactylis glomerata)*	2	6	MWD - ED
Timothy *(Phleum pratense)*	1	2	PD - WD
Ladino Clover *(Trifolium repens)*	¼	¼	PD - WD
Birdsfoot Trefoil *(Lotus corniculatus)*	2	4	PD - WD
Note: The following species can be substituted for mixtures containing both Timothy and Orchardgrass:			
Canada wildrye *(Elymus canadensis)*	2	3	MWD - WD
Virginia wildrye*(Elymus virginicus)*	1	2	PD - WD

[1] Mix better suited for sites **south** of Interstate 70.
[2] Mix can be used on droughty sites.
[3] Mix better suited for sites **north** of Interstate 70.
[4] Mix can be used on wet sites.
[5] Substitutes for *Lespedezas* must be used on sites north of Interstate 70.
[6] Use ½ to 1 lb. of a perennial forb mix, with a minimum of 5 species (see Forb List below) in approximately equal proportions.

Guidance for when to use *Wildlife* or *Erosive Area* seeding rates.

	Wildlife Rate	Erosive Area Rate
Northern Indiana	LS =< 0.39	LS => 0.40
Southern Indiana	LS =< 0.79	LS => 0.80

The **Wildlife Rates** are to be used for the flatter portions of fields that are less erosive. The **Erosive Area Rates** are for the slopes, drainage ways, and other more erosive areas of the field. Planners should look at LS values to help determine the break between the Erosive Areas rates and wildlife rates. Adapt application rates in Tables 4 and 5 to met local conditions. (For more information on LS values refer to USDA Agricultural Handbook 703).

Note: Add any of the forb species, at the rates listed below, to the mixes in Tables 4 and 5 for added wildlife and aesthetic benefits. Any of the legumes (L) may be substituted, at the rates listed below, for one of the legumes in the mixtures listed in Table 5

Forb List

Species	oz./ acre	Soil Drainage Class Suitability
Blackeyed Susan *Rudbeckia hirta*	1	MWD-ED
Butterfly Weed *Asclepias tuberosa*	3	MWD – ED
Button Blazing Star *Liatris aspera*	2	MWD – ED
Cardinal Flower *Lobelia cardinalis*	0.5	PD - SPD
Dense Blazing Star *Liatris spicata*	2	PD – WD
Entire-Leaf Rosinweed *Silphium integrifolium*	4	MWD – ED
False Sunflower *Heliopsis helianthoides*	1	MWD – ED
Flat Topped Aster *Aster umbellatus*	2	PD – SPD
Gray-Headed Coneflower *Ratibida pinnata*	2	MWD – ED
Hoary Tick Trefoil (L) *Desmodium canescens*	3	MWD – ED
Lead Plant *Amorpha canescens* (L - small shrub)	1	WD – ED
Lespedeza, Roundheaded *Lespedeza capitata* (L)	2	MWD – ED
Lespedeza, Slender *Lespedeza virginica* (L)	2	MWD – ED
New England Aster *Aster novae-angliae*	1	PD – WD
New Jersey Tea *Ceanothus americanus* (small shrub)	2	MWD - ED
Nodding Bur Marigold *Bidens cernua*	2	PD - SPD
Obedient Plant *Physostegia virginiana*	2	PD - SPD
Ohio Spiderwort *Tradescantia ohiensis*	2	SPD – WD
Partridge Pea *Cassia fasciculata* (L)	4	MWD – ED
Prairie Dock *Silphium terebinthinaceum*	4	SPD – ED
Riddell's Goldenrod *Solidago riddelli*	1	SPD – ED
Sawtooth Sunflower *Helianthus grosseserratus*	1	PD – WD
Sneezeweed *Helenium autumnale*	1	PD - SPD
Spotted Joe Pye Weed *Eupatorium maculatum*	1	PD - SPD
Swamp Aster *Aster puniceus*	1	PD - SPD
Swamp Milkweed *Asclepias incarnata*	3	PD - SPD
Tall Coreopsis *Coreopsis tripteris*	3	SPD – ED
Virginia Blue Flag *Iris virginica var. shrevei*	4	PD - SPD
Virginia Mountain Mint *Pycnanthemum vir.*	1	SPD – WD
White Wild Indigo *Baptisa leucantha* (L)	4	MWD – ED
Wild Bergamot *Monarda fistulosa*	2	SPD – WD
Wild Quinine *Parthenium integrifolium*	2	MWD – ED
Wild Senna *Cassia hebecarpa* (L)	4	PD – WD

(L) = Legume

CONSIDERATIONS

General

Soils and site potential should indicate which plant species to select.

Irregular edges on plantings and transition areas are preferred over straight or square plantings.

Prevent improper use of wildlife areas by livestock.

Consider developing wildlife management plans with assistance from an NRCS Biologist, IDNR District Wildlife Biologist, or FWS Biologist when a plan is large or complex. Planners should seek assistance for plans addressing the needs of multiple wildlife species or for sites 5 acres or larger.

Food

Consider developing one food plot for every 40 acres of land as a minimum, not to exceed 5% of total planned acreage.

Consider locating food plots in the least erosive areas of the field, and dispersing evenly.

Consider making food plots at least 50 feet wide, and a minimum of ¼ acre. In high deer density areas, food plots should be planted in squares with a plot size of 2 to 5 acres.

Consider leaving grain strips along field edges, adjacent to other cover types.

Consider inter-seeding legumes into the existing cool season grass stands to provide a needed food source and add plant diversity to attract greater insect populations.

Weed control is not required as the presence of some forbs, such as foxtail, smartweeds and ragweed actually benefit wildlife by providing higher protein and greater number of seeds than domestic grains.

Consider planting up to 50% pine and softwood trees throughout the plantation as trainer trees.

Consider the use of potted stock to establish trees on sites where wildlife habitat is the primary concern and soft or hard mast production is a limiting factor for the species of wildlife being considered. This method of tree planting is to be used where "old field" habitat with scattered trees is desired. Select only species adapted to the site giving preference to hard mast species. Species typically associated with woodland edges and old-field habitats will benefit most from this type of management. This practice is not intended for use where grassland or interior woodland species are the primary species of concern.

Consider using potted stock to produce fruit in a shorter amount of time than trees established utilizing conventional seedling planting methods. Wide spacing and additional height, trees planted in this manner will develop into trees, which will reach maturity sooner than trees, which are established through natural regeneration. The containerized trees will consequently be able to produce fruit and mast as a food source for wildlife more quickly than in traditional seedling plantings. Native trees, shrubs, and forbs will establish around the containerized trees pioneering from the surrounding woodlands or brought in from floodwaters.

Consider using natural regeneration if the sites have a seed source from adjacent wooded areas or from a forested flood plain system where seeds are deposited. Natural regeneration of light seeded species (e.g. green ash, silver maple, cottonwood and others) is likely to establish large numbers of tree seedlings. For wildlife purposes, natural regeneration is generally acceptable for a distance of 300 feet from a woods edge. Natural regeneration is also considered likely on frequently flooded-forested flood plains.

Cover

Consider Emphasizing placement of tree and shrub plantings, which connect, isolated wooded sites.

Consider using seed sources for warm season grasses, direct seeding, and woody planting stock which are locally adapted and come from no

more than 200 miles north or south of the planting site.

Sites that are frequently flooded or ponded for long or very long duration may be difficult and unpractical for tree/shrub establishment. Consider using natural regeneration on these sites to establish woody plants and allow the site to re-vegetate to herbaceous and/or woody plant cover.

Norway Spruce, a non-native to Indiana, may be used in cases where severe deer problems exist.

Consider creating brush piles for wildlife cover with materials left from forest stand improvement work. Brush piles should be distributed adjacent to clearings, roads, and along the outer edges of the site. Piles should be 15 to 20 feet in diameter, and four to eight feet high. See brush pile jobsheet for more details.

PLANS AND SPECIFICATIONS

Plans and specifications for this practice shall be prepared for each site. Plans and specifications shall be recorded using approved specification sheets, job sheets, technical notes, or narrative documentation in the conservation plan, or other acceptable documentation.

Management plans will contain, at a minimum:

- Primary species of concern, as determined by land user.
- Habitat limitations and how limitations will be addressed.
- Site map.
- Seeding recommendations for all habitat elements.
- Watering information based on species.
- Food plot maintenance plan, if needed.

OPERATION AND MAINTENANCE

A plan for operation and maintenance of upland wildlife habitat at a minimum shall include monitoring and management of structural and vegetative measures. Actions will be carried out to ensure these practices function as intended throughout their expected lives. These actions include normal repetitive activities in the application and use of the practice (operation) such as prescribed fire, disking, or mowing, and repair and upkeep of the practice (maintenance) such as replacement of vegetative component as needed.

Management measures shall be provided to control invasive species and noxious plants on a "spot" basis.

Control weed competition for tree and shrub establishment for 3 years. Competing weeds, brush, and vines can adversely affect survival, form and rate of tree growth. Additional years of weed control may be needed in some instances e.g. to control Johnsongrass, Quackgrass, or other hard to control weed species.

If mowing is necessary, mow between July 15 – August 15 to protect ground nesting wildlife and allows residual growth. Mow no more than 1/4 or 1/3 of the field every year. Rotate mowed strips across the field every year. Mow cool season grasses no shorter than 6 inches and native warm season grasses no shorter than 10 inches.

Use FOTG (338) *Prescribed Burning*, light strip disking, haying or grazing to remove excess litter. If grazing or prescribed burning is used, it shall be in accordance with a prescribed plan. All Prescribed Burning plans shall include a firebreak following the FOTG (394) *Firebreak* Standard.

Manage habitat elements in proper amounts and locations to benefit desired wildlife species.

Apply supplemental nutrients only as needed to maintain the desired species composition and stand density.

When using potted stock, weed control is important to insure plant survival. If used, weed barrier fabric squares can effectively control competing vegetation. See FOTG (612) *Tree/Shrub Establishment* for information on the installation of weed barriers. The minimum

width of weed barrier materials is 3 feet and shall be installed according to manufacturer directions. The weed barrier should be permeable, have a minimum thickness of 15 mil, be capable of preventing underlying plant growth, and last a minimum of three years after placement. Where non-native invasive species are a problem, appropriate control measures will be taken.

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